REMARKS

Claims 1-4 are all the claims pending in the application.

Claim 1 has been objected to because of a minor informality.

Claims 1-4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hafeman, et al. (US 5,164,319) in view of Marks, et al. (US 6,203,758).

The Applicant traverse the rejections and requests reconsideration.

Rejection of claims 1-4 based on 35 U.S.C. § 103

As noted in the response filed January 3, 2003, Marks does not suggest a chemical CCD. It appears that the Examiner is using Hafeman to overcome the deficiencies in the teachings of Marks. Specifically, the Examiner contends that Hafeman teaches a chemical CCD where charge is proportional to the quantity of a chemical. The Applicant respectfully submits that, Hafeman uses a technique entirely different from the subject invention.

In Hafeman, fluid is introduced into a channel 16 (Fig. 1) and separate chemical reactions occur at binding members 24. The reactions affect the surface potential at the binding members, which in turn affects the capacitance of the semiconductor under the binding members 24. The combined capacitance of the semiconductors is then measured to indicate the degree of chemical reaction.

This is very different from the present invention. The present invention requires a chemical CCD having a plurality of potential wells in which electrical charges are injected. The combined teachings of Hafeman/Marks does not suggest such a chemical CCD with a plurality of potential wells.

Further, in the present invention, the chemical CCD is constituted such that the depth of the potential well changes corresponding to a chemical quantity. Since the combined teachings of Hafeman/Marks does not suggest potential wells, it cannot be suggesting potential wells whose depth change with a chemical quantity.

Measuring a chemical quantity based on changes in the depth of a plurality of potential wells is very different from measuring chemical reactions based on changes in capacitance of a series of semiconductor placed under junctions at which the chemical reactions occur. A skilled artisan would not have been able to make the present invention, as recited in claims 1-4, from the combined teachings of Hafeman/Marks.

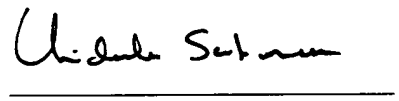
The Applicant respectfully reiterates that the specification clearly traces the construction of the apparatus in very great detail. CCD is simply any device that stores charges in a depletion region (potential well). In CCD detection devices, the charges correspond to proportional quantities of other parameters like light. In a chemical CCD the charge is proportional to the quantity of a detected chemical. The specification clearly describes the structure of a chemical CCD with reference to Figs. 7 and 8 (Specification 4:22-5:17). Further, the principle of how the chemical CCD is used to measure a quantity of a chemical and how the charges stored are transferred to a corresponding signal which is then measured using a signal processing machine is described with reference to Fig. 9 (specification 6:18-8:14). This explanation of the functioning of a chemical CCD will further help in distinguishing the present invention, as recited in claims 1-4, from the cited references.

CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: May 15, 2003

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (ONCE AMENDED) A molecular recognition type chemical CCD comprising:

a chemical CCD having a plurality of potential wells constituted to change a depth corresponding to a chemical quantity, and being arranged two-dimensionally, in which electric charges are injected into the potential wells and the chemical quantity is converted into an electric charge corresponding to the sizes of the potential wells;

a molecular recognition layer formed on a sensor face of a chemical CCD, said [molecular] molecules recognition layer selectively capture molecular of certain chemical substances.